

Amendments to the Claims:

Please amend the claims to read as follows:

1. (Currently amended) A B moiety of a pore-forming binary A-B toxin, wherein said B moiety comprises a mutation that inhibits its pore-forming ability, and wherein said mutation is not the ~~deletion of~~ mutation of Phe313, Phe314, or Asp315 of anthrax protective antigen or corresponding residues in B moieties other than anthrax protective antigen. amino acids 302-325 of anthrax protective antigen (SEQ ID NO. 12).

2. (Original) The B moiety of claim 1, wherein said B moiety is anthrax protective antigen.

3. (Original) The B moiety of claim 1, wherein said B moiety lacks pore-forming ability.

4. (Currently amended) The B moiety of claim 50 ~~4~~, having an amino acid sequence that is at least 80% identical to SEQ ID NO.: 21, ~~and that has an alteration selected from the group consisting of:~~

a) K397A;

b) K397D;

c) K397C;

d) K397Q;

e) D425A;

f) D425N;

g) D425E;

h) D425K;

i) F427A;

- j) ~~K397D + D425K double mutation;~~
- k) ~~K395D + K397D + D425K + D426K;~~
- l) ~~K397D + D425K + F427A triple mutation;~~
- m) ~~F427A + ΔD2L2 double mutation;~~
- n) ~~K397D + F427A + ΔD2L2 triple mutation;~~
- o) ~~K397D + D425K + F427A + ΔD2L2 quadruple mutation;~~
- p) ~~F427D;~~
- q) ~~F427K; and~~
- r) ~~ΔD2L2.~~

5. (Cancelled)

6. (Currently amended) A vaccine composition comprising a B moiety of a pore-forming binary A-B toxin or a fragment thereof in a pharmaceutically acceptable carrier, wherein said B moiety comprises a mutation that inhibits its pore-forming ability and wherein said mutation is not the mutation of Phe313, Phe314, or Asp315 of anthrax protective antigen or corresponding residues in B moieties other than anthrax protective antigen.

7. (Original) The vaccine composition of claim 6, wherein said B moiety is anthrax protective antigen.

8. (Original) The vaccine composition of claim 6, wherein said B moiety is inactivated by chemical or physical means.

9.—11. (Cancelled)

12. (Currently amended) A mutant B moiety of a pore-forming binary A-B toxin, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming ability,

wherein said mutation is not the mutation of Phe313, Phe314, or Asp315 of anthrax protective antigen or corresponding residues in B moieties other than anthrax protective antigen, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin, ~~wherein said mutation is not the deletion of amino acids 302-325 of anthrax protective antigen (SEQ ID NO: 12).~~

13. (Original) The mutant B moiety of claim 12, wherein said mutant B moiety is anthrax protective antigen.

14. (Original) The mutant B moiety of claim 13, having the ability to bind lethal factor or edema factor.

15. (Original) The mutant B moiety of claim 12, having the ability to compete with said naturally occurring B moiety for binding to a receptor on the surface of a mammalian cell.

16. (Original) The mutant B moiety of claim 12, having the ability to bind said naturally-occurring B moiety.

17. (Original) The mutant B moiety of claim 12, having the ability to oligomerize with said naturally-occurring B moiety to form a complex that has reduced ability to form a pore.

18. (Original) The mutant B moiety of claim 17, wherein said complex lacks the ability to form a pore.

19. (Currently amended) The mutant B moiety of claim 51 42, having an amino acid sequence that is at least 80% identical to SEQ ID NO.: 21, ~~and that has an alteration selected from the group consisting of:~~

a) ~~K397D + D425K double mutation;~~

b) ~~K395D + K397D + D425K + D426K quadruple mutation;~~

e) ~~D425K;~~

d) ~~F427A;~~

e) ~~K397D + D425K + F427A triple mutation;~~

f) ~~F427A + ΔD2L2 double mutation;~~

g) ~~K397D + F427A + ΔD2L2 triple mutation;~~

h) ~~K397D + D425K + F427A + ΔD2L2 quadruple mutation;~~

i) ~~F427D; and~~

j) ~~F427K.~~

20. (Currently amended) The mutant B moiety of claim ~~13~~ 12, further comprising a deletion of at least 5 amino acids of the D2L2 loop.

21.—28. (Cancelled)

29. (previously added) The B moiety of claim 2, having an amino acid sequence that is at least 80% identical to SEQ ID No.:21.

30. (Currently amended) The mutant B moiety of claim 19, further comprising a deletion of ~~amino acids 302–325 of the D2L2 loop in anthrax protective antigen or a corresponding mutation in a different B moiety.~~

31. (Currently amended) The mutant B moiety of claim ~~2~~ 1, wherein said mutation is in the PA63 domain of said B moiety ~~if said B moiety is anthrax protective antigen.~~

32. (Cancelled)

~~33. (Currently amended) A vaccine composition comprising a mutant B moiety of~~ _____
a pore-forming binary A-B toxin or a fragment thereof in a pharmaceutically acceptable carrier, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming

ability, wherein said mutation is not the mutation of Phe313, Phe314, or Asp315 of anthrax protective antigen or corresponding residues in B moieties other than anthrax protective antigen, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.

34. (Currently amended) The vaccine of claim 7 6, wherein said mutation is in the PA63 domain of said B moiety ~~if said B moiety is anthrax protective antigen~~.

35. (Currently amended) The vaccine of claim ~~32~~ 33, wherein said B moiety is anthrax protective antigen, and wherein said mutation is in the PA63 domain of said B moiety ~~if said B moiety is anthrax protective antigen~~.

36.—39. (Cancelled)

40. (New) A B moiety of a pore-forming binary A-B toxin, having an amino acid sequence that is at least 80% identical to SEQ ID NO:21, and comprising a mutation that inhibits its pore-forming ability, wherein said mutation is D425K in anthrax protective antigen or a corresponding mutation in a different B moiety.

41. (New) A mutant B moiety of a pore-forming binary A-B toxin, comprising a mutation that inhibits its pore-forming ability, wherein said mutation is D425K in anthrax protective antigen or a corresponding mutation in a different B moiety, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.

42. (New) A vaccine composition comprising anthrax protective antigen or an anthrax protective antigen fragment in a pharmaceutically acceptable carrier, wherein said anthrax protective antigen or anthrax protective antigen fragment comprises a mutation that inhibits its pore-forming ability, wherein said mutation is not the mutation of Phe313, Phe314, or Asp315.

43. (New) The vaccine composition of claim 42, wherein said anthrax protective antigen fragment is the C-terminal 63 kDa tryptic fragment of anthrax protective antigen.

44. (New) The vaccine composition of claim 42, wherein said anthrax protective antigen fragment has a deletion of the amino acids that form the transmembrane pore.

45. (New) The vaccine composition of claim 42, wherein said vaccine comprises anthrax protective antigen, and said mutation is in the PA63 domain.

46. (New) The vaccine composition of claim 42, wherein said anthrax protective antigen or anthrax protective antigen fragment is inactivated by chemical or physical means.

47. (New) A vaccine composition comprising a mutant B moiety of a pore-forming binary A-B toxin in a pharmaceutically acceptable carrier, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming ability, wherein said mutation is D425K in anthrax protective antigen or a corresponding mutation in a different B moiety, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.

48. (New) The vaccine composition of claim 47, wherein said pore-forming binary A-B toxin is a *Clostridium perfringens* toxin, and said corresponding mutation is D452K.

49. (New) The vaccine composition of claim 47, wherein said pore-forming binary A-B toxin is a *Clostridium botulinum* toxin, and said corresponding mutation is D426K.

50. (New) The B moiety of claim 1, wherein said mutation that inhibits its pore-forming ability is selected from the group consisting of:

- a) K397A in anthrax protective antigen or a corresponding mutation in a different B moiety;

- b) K397D in anthrax protective antigen or a corresponding mutation in a different B moiety;
- c) K397C in anthrax protective antigen or a corresponding mutation in a different B moiety;
- d) K397Q in anthrax protective antigen or a corresponding mutation in a different B moiety;
- e) D425A in anthrax protective antigen or a corresponding mutation in a different B moiety;
- f) D425N in anthrax protective antigen or a corresponding mutation in a different B moiety;
- g) D425E in anthrax protective antigen or a corresponding mutation in a different B moiety;
- h) D425K in anthrax protective antigen or a corresponding mutation in a different B moiety;
- i) F427A in anthrax protective antigen or a corresponding mutation in a different B moiety;
- j) K397D + D425K double mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- k) K395D + K397D + D425K + D426K quadruple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- l) K397D + D425K + F427A triple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- m) F427A + Δ D2L2 double mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;

- n) K397D + F427A + Δ D2L2 triple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- o) K397D + D425K + F427A + Δ D2L2 quadruple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- p) F427D in anthrax protective antigen or a corresponding mutation in a different B moiety; and
- q) F427K in anthrax protective antigen or a corresponding mutation in a different B moiety.

51. (New) The mutant B moiety of claim 12, wherein said mutation that inhibits its pore-forming ability is selected from the group consisting of:

- a) K397D + D425K double mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- b) K395D + K397D + D425K + D426K quadruple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- c) D425K in anthrax protective antigen or a corresponding mutation in a different B moiety;
- d) F427A in anthrax protective antigen or a corresponding mutation in a different B moiety;
- e) K397D + D425K + F427A triple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- f) F427A + Δ D2L2 double mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
- g) K397D + F427A + Δ D2L2 triple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;

- h) K397D + D425K + F427A + Δ D2L2 quadruple mutation in anthrax protective antigen or a corresponding mutation in a different B moiety;
 - i) F427D in anthrax protective antigen or a corresponding mutation in a different B moiety; and
 - j) F427K in anthrax protective antigen or a corresponding mutation in a different B moiety.
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